

## Final Report to the NPLCC and NW Climate Science Center (Agreement #AP01046)

### 1. ADMINISTRATIVE INFORMATION:

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Title: Klamath Basin Traditional Ecological Knowledge and Climate Change Science Internship

### 2. PUBLIC SUMMARY:

The Quartz Valley Indian Reservation (QVIR) partnered with tribes, federal agencies, watershed councils, and higher education institutions in the Klamath Basin for this project during summer of 2014. This project built upon current efforts to integrate western science and traditional ecological knowledge (TEK) for climate change planning and adaptation in the Klamath Basin. North Pacific Landscape Conservation Cooperative (NPLCC), Northwest Climate Science Center (NW CSC), and additional federal funding from the USDA Forest Service and other federal agencies supported five tribal interns. The internship project was 10-weeks in the summer 2014. The tribal students were college-level from the Klamath Tribes, QVIR, Karuk Tribe, Hoopa Valley Indian Reservation, and the Yurok Tribe, all federally recognized tribes in the Klamath Basin. The intern program trained students in both, the standard western science as well as traditional ecological knowledge and their application to climate change planning in the Klamath Basin. Students had professional mentors from tribes and federal agencies and gained experience in local and regional environmental monitoring, analysis, management and policy issues related to tribal traditional knowledge and Climate Change. Students were able to have traditional teachings from and worked with tribal elders and cultural resource professionals of their own tribes to understand how TEK may be integrated with western science to inform natural resource and climate related-policy and management in the Klamath Basin.

Major benefits for natural and cultural resource managers was the on the ground project work and the students' final reports and presentations that described each student's experience and general findings. Through data collection students addressed questions regarding: fire, drought and forest related effects of climate on tribal traditional foods; aquatic habitat restoration approaches; stream temperature refugia critical to fisheries; and climate effects to tribally value species. This project accomplished having five tribal interns who received professional learning experience in forestry, vegetation, and fuels sampling, fisheries habitat and water quality restoration working with their tribes, watershed councils, and a federal agencies.

### 3. EXECUTIVE SUMMARY:

The project goals/objectives were to have tribal interns receive a professional learning experience in research methods, habitat restoration practices, and conservation planning while working with their tribe, watershed councils (non-governmental organizations), and a federal agencies. Mentors assisted

interns in the development of a climate change related reports, in which each student described the vulnerability to a tribally valued resources and presented a summary assessment addressing how climate and related disturbances affect local species and their habitats. Originally six tribal student interns were desired; only five were available to participate. These tribal students worked with tribal elders, cultural resource professionals, resource specialists, and agency managers and scientists to develop specific achievements such as a report and presentation that identified opportunities for TEK/western science collaborations in the Klamath Basin. This are on file with Lake (USFS-PSW) and Super (USFWS-KBTYP). Major lessons learned were that this intensive 10 week schedule did provided a strong introduction and direct experience with climate related natural and cultural issues in the Klamath Basin, but that the students felt they were worked too hard, had rigorous long day activities that were a trade-off in missing some cultural opportunities (e.g., tribal ceremonies and subsistence activities). All aspects of the original proposal for the project's intent were accomplished and made possible by receiving NPLCC, NW CSC, and additional USFS funding as a flagship project. This project contributed directly to the advancement of scientific knowledge (TEK and Climate science), supporting management needs with participating in on-the-ground project with tribes, federal agencies, and community organizations within the region, and nationally with having one of the students participate and present on the project in a national landscape conservation conference in Washington, D.C.

#### 4. PURPOSE AND OBJECTIVES:

The project addressed the issues of how tribal TEK can be incorporated into Climate science activities associated with research and management of natural and tribal cultural resources. The target audience for the project results and products are tribes, agencies, community organizations, the public as well as researchers and managers within the Klamath Basin, as well as those nationally seeks such examples. The project contributed to each of the seven NPLCC goals and both goals of the NW CSC included in their Strategic Plan. In particular, the project contributed directly to goal to promote the use and sharing of science and traditional knowledge to support resource research and management efforts in the Klamath Basin. The project also contributed to NPLCC and NW CSC goals to promote awareness and understanding of the effects of climate change on ecosystems, cultures and economies. The project goals and objectives were to: Foster a more collaborative tribal, local community-based, and government approach to climate change adaptation and planning in the Klamath Basin; Tribal interns were mentored by tribal elders, natural and cultural resource professionals from each tribe, community organizations, and federal agencies. Interns were mentored by scientists from the NASA, United States Geological Survey, U.S. Forest Service and U.S. Fish and Wildlife Service. One deviation from the original proposal was to include working with community-based organizations (e.g., Mid Klamath Watershed Council, Salmon River Restoration Council, and Lomakatsi Restoration Project) as these groups work with tribes and agencies on related monitoring and research efforts pertaining to the scope of this project. A few minor elements of the scope of work for the depth and sophistication of the research questions eliminated and modified from the original proposed objectives, because a sixth student was not able participate, and the education and experience level of the students. The scope of the original proposal and subsequent advertisement for the interns regarding scope of research topics had an overly ambitious goal. The academic level (ie. Community college, first or second year university vs. graduate)

and background, such as course work experience students had with climate-related science disciplines, required a modification in the scope of methods, ground based data collection, and analysis approached used for the students to complete their reports and presentations. For many students, the project deliverables, such as the report and presentation requirement, was a first-time training and mentoring. The students resisted some of the western academic rigor imposed on them, but understood the value and what they gained from having to do intensive field work, and prepare deliverables at the conclusion of the project. Many tribal students may not be as comfortable with the heavy academic “western science” approaches integrated with the tribal TEK, and would have preferred less intensive fieldwork and more time with tribal elders and practitioners, as well with tribal resource specialists. This project uniquely combined both aspects of western and tribal climate science, a rare opportunity that most tribal students do not have an opportunity to learn from.

#### 5. METHODS, ORGANIZATION AND APPROACH:

Task-oriented project activities that were conducted included an intensive ten week schedule that included an introductory two week tour of the basin, from coast to interior rivers and mountains, meeting with university, tribal, community based organizations, and community members. Followed by a stay at NASA in the third week. Weeks 4-8 of the schedule included field based activities in which students conducted forestry-vegetation survey data collection training, river/fisheries restoration activities, field tours of restoration projects, and time with tribal members and resource professionals. During this time, students were exposed to webinars, presentations, and publications on climate related natural and cultural resources. The last two weeks the students were able to narrow down their individual research topic, conduct follow-up interviews with tribal members and resource specialists, collect supporting data and information to compile and develop their papers and presentations.

The tasks (objectives) included in the original proposal were much more refined and included more intensive activities than were initially described. Mentors assisted interns with applying tools such as climate change vulnerability assessments, which were not very well understood by the students, to particular local tribal ecosystem needs. There was a slight deviation from how TEK was incorporated to inform larger landscape scale climate and conservation analysis, including surrogate species analysis, as the students, based on their knowledge and academic capacity could only address a limited range of issues. Tribal interns did have the opportunity to learn how their own tribe’s traditional land management practices that can inform habitat restoration activities. Interns did work with restoration practitioners to implement practices (e.g., field based activities) that provided a more desirable ecological condition for subsistence foods or other traditionally important species. The lead science and TEK mentor, Dr. Frank K. Lake (USFS-PSW) challenged the students academically, intellectually, and with rigorous field based activities throughout the project.

#### 6. PROJECT RESULTS:

Quantitative results-five tribal college-level students had an intensive field-based experience learning the tribal and western science issues regarding climate and related disturbances and how these ecological as well as socio-cultural factors affect tribally valued resources. Each student prepared and

submitted a final draft paper and presentation on their specific research topic of interest. Interns assisted with data collection for five forestry-vegetation-fuels plots to support the USFS-PSW tribal food security project; assisted the Mid Klamath Watershed Council (MKWC) on geomorphic, water quality and fisheries surveys for cold-water refugia and stream restoration for threatened fisheries (Coho). Assisted the Salmon River Restoration Council and MKWC youth program for creek mouth enhancement; Assisted USGS and USFS with stream sampling in the upper basin-Sprague river; and engaged in two raft/boat trips with tribal organizations (Warrior Institute, and Ah-Pah village) to learn and share TEK. Qualitative results- The intensive ten week schedule was too busy, and more time should have been allocated for direct cultural sharing and learning TEK in a more tribally traditionally based approach. Wildfires, such as evacuations and road closures, as well as vehicles for transportation added unforeseen complications, which resulted in longer travel times and adjustment to some planned activities. \*This NPLCC and NW CSC supported project was selected as a Climate Flagship project by the USDA-Forest Service Pacific Southwest Research Station and Regional 5 leadership. This brought additional funding (\$8,000-9,000) support to supplement the NW CSC, NPLCC and USFWS funding, but required additional scheduling (meeting with USFS), administrative (additional OMB volunteer form, reimbursement and federal travel compliance), and fiscal (reimbursement regulations different from USDA-FS to DOI-USFWS) requirements that benefited but also added burdens to the lead mentor (Lake USFS) and program coordinators (Super-USFWS).

## 7. FINDINGS AND CONCLUSIONS:

Research/project findings- An innovative approach was taken with this project to incorporate tribal TEK into Climate science related research and monitoring. The ten week project included field based forestry, river/fisheries, and cultural activities that involved tribes, agencies, academic and community-based organizations to education and provide experiences for five college-level tribal youth. In the process of implementing the project it was discovered that many of the climate related natural and cultural resource issues important to tribes, communities, and managers in the Klamath Basin are still very local scale issues, with broader level similarities. In particular, climate influenced ecological processes such as fire, drought, and hydrology affect valued resources but the particular habitats (e.g., mixed conifer/hardwood forests) and species (e.g., Coho or Lost River sucker) are different in each respective area of the basin. Additionally, that the amount of information on natural and cultural resources for particular localities and tribes varies, but in an interdisciplinary approach is great and can be overwhelming for tribal students being immersed and exposed to it for the first time at such a broad level. Interns learned of the complexities, such as differences in the communities, from coastal to upper basin, as well as jurisdictional and land tenure, applicable policies and regulations adhere to boundaries whereas the impacts of climate change are felt throughout. Solutions for local level climate and TEK related issues were tribally or area specific being offered and presented by the interns, Accomplishments of the project team were reported to the USDA Forest Service for their Climate Score Card reporting for the Flagship project requirements, and included week by week summaries and documentation of the activities and events (Lake and Super, on-file). Other pertinent information relevant to the project results include the feedback from the interns that while they had an intensive experiences, learned a lot about new and complex issues around Climate Change, the demanding and

full day to day weekly schedule, did prevent them from engaging in cultural activities such as ceremonies and subsistence activities, which are traditional methods of learning and maintaining their own TEK and relationship with resources.

#### 8. LESSONS LEARNED AND RECOMMENDATIONS:

The main lesson learned was that college-level tribal youth, as the project interns can be exposed to and learn of the complexities facing their community and resources in an intensive ten week project. That such a project take strong and committed mentors and diligent coordination and working out logistics and schedules among partners. Additionally that TEK can be learned in a formal organized project, and student interns can experience the academic/agency approach to TEK as well as the more traditional and culturally based activities. The largest problem encountered during the project was trying to do too much in a limited ten week time where multiple funding sources each had their own requirements and administrative processes for expenditures. In particular, there is a lack of knowledge among federal agency Grants and Agreements, as well as Procurement staff on how to work effectively with tribes on the transfer of funding, reimbursement and for covering expenses associated with the transportation, lodging, Per Diem, services from tribal practitioners, and adhering to required federal fiscal regulations. All these inter/cross agency and government (DOI-USFWS and BIA; USDA-USFS, and tribal governments) funding transfer, and cost sharing for particular expenses and activities should be known and worked out prior to the start of the project. If student interns are required to be federal agency “volunteer” then the different departments (DOI and USDA) who all follow federal guidance and regulations should make sure the student interns understand what is expected of them to participate if a project of this magnitude is to be conducted again. Recommended next steps based on what was learned from this project include: Be flexible on the candidate pool of tribal student applicants, as climate change affects all, just not the natural resource or physical science college majors; If the project is selected for some formal agency mandate or program understand the complexities for and the requirements for such recognition; Share the responsibility for planning, schedules, and logistics among the partners for different administration, budget, transportation, and related activities so the lead mentor(s) can focus on the day to day activities of the project rather than inter-agency/tribal bureaucracy.

#### 9. MANAGEMENT APPLICATIONS AND PRODUCTS:

The expectation is that the findings of this project, primarily the final report, weekly activity summaries, and the tribal student papers and presentations to be used to inform the NPLCC steering committee and the S-TEK sub-committee, and the NW CSC, as well as the tribal, community-based organizations, and agency managers involved with climate change aspects related natural or cultural resources. Roles and contributions-Dr. Frank K. Lake, USDA-Forest Service, was the lead mentor; Trevor Super, USFWS-KBYTP, was a project coordinator; Erin Williams, USFWS-Yreka office was project manager and provided oversight of USFWS contributions; Darla Eastman, USFWS-KBTYP, logistic coordinator; Sue Mattenberger, USFWS Klamath Falls, Upper Basin facilitator; Cindy Schmidt, NASA Ames Research Center, Center Facilitator; Marla Bennett, Quartz Valley Indian Reservation, finance administrator of NPLCC/NW CSC funds; Lonyx Landry, CSU Humboldt/INRSEP, campus host; David West, Oregon State University/Native Studies, campus host;

## 10. PUBLICATIONS AND OUTREACH

Student research papers were produced and submitted to Dr. Lake. These documents are attached at PDF files.

(Shahnie Clark Paper.pdf)

(Darcey Evans Paper.pdf)

(Talonna Nelson Paper.pdf)

(Charlie Reed Paper.pdf)

(Anthony Ulmer Paper.pdf)

Climate change and Tribal Ecological Knowledge Summer Internship Presentation was held on August 21<sup>st</sup>, 2014. Presentations from students were given at the Karuk Tribal Housing Office in Yreka, Ca. A webex was offered to partners who could not attend in person.

Presentation slides are attached in PDF format.

(Student Research Project Final Presentation .pdf)